EPA United States Environmental Protection Agency

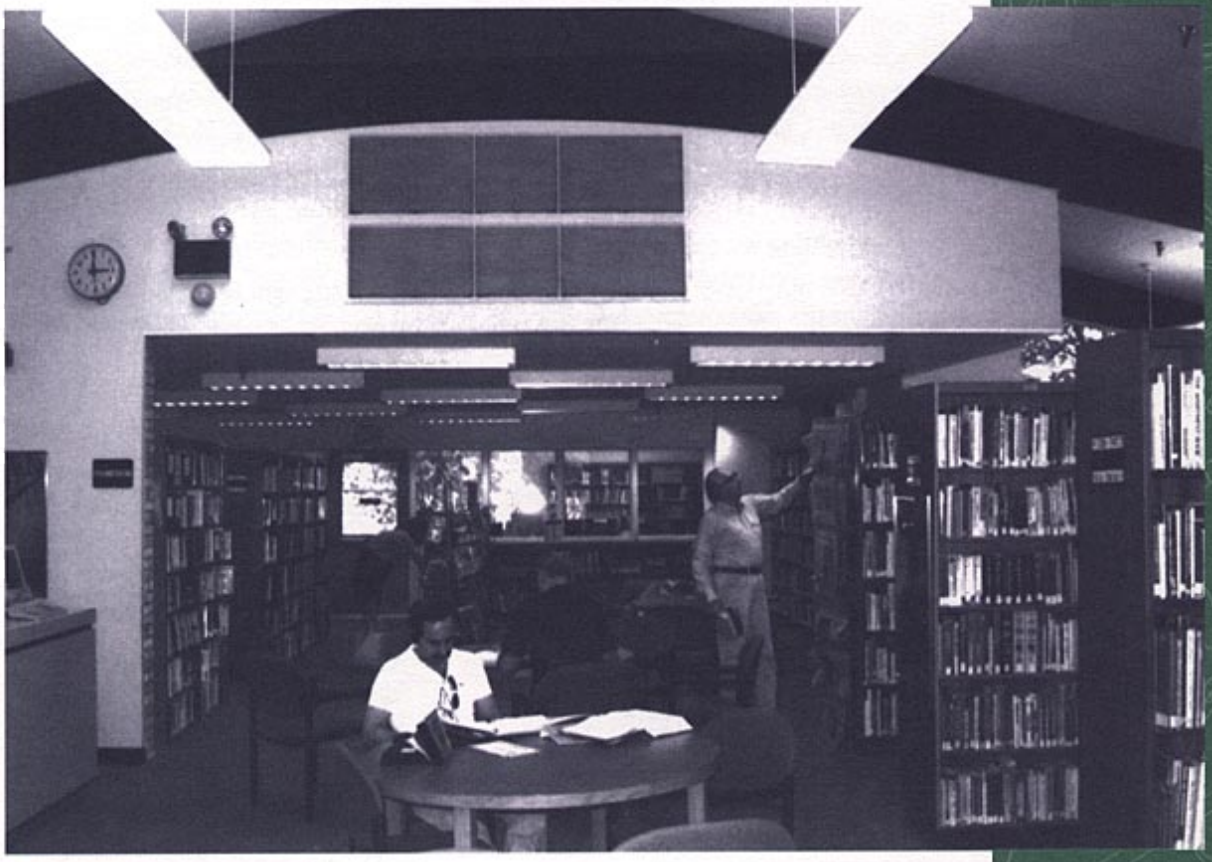
Air and Radiation (6202J)

EPA 430-F-96-057
October 1996

APPLICATION PROFILE

Improving Commercial Light Levels

EPA Green Lights
an ENERGY STAR program



Montgomery County Council

Little Falls Library
Glen Echo, Maryland

Senior Energy Engineer:
Ron Balon

Contractor:
Light of the World Signs

Utility:
Potomac Electric Power Co.

PROJECT RESULTS

Energy Savings	60%
Installed Cost	$10,270
Rebate	$3,500
Internal Rate of Return	77%
Simple Payback	1.3 years
Annual kWh Savings	78,000 kWh
Pollution Prevention	
CO_2	124,800 lbs/yr
SO_2	1,200 lbs/yr

TYPICAL APPLICATIONS

- Offices
- Libraries
- Classrooms
- Health Care

IMPROVING INDUSTRIAL LIGHTING

Adjusting Lighting Levels and Quality to Meet Visual Requirements

For help in selecting upgrades to adjust light levels, contact a Green Lights Surveyor Ally. For a list of these individuals, call the Green Lights Hotline at 1-888-STAR-YES.

Modern industrial lighting design seeks to improve worker productivity, product quality, and accident prevention while maintaining an aggressive energy management program. Consequently, industrial lighting projects require a careful investigation and understanding of the workplace, tasks, and lighting technology options. A Green Lights upgrade offers an ideal opportunity to assess the visual requirements of the workplace, and provide the appropriate quantity and quality of light with the most energy-efficient lighting system. With a properly designed lighting upgrade, savings opportunities don't stop with the electricity bill; even a 1% increase in labor productivity can yield financial savings that exceed the entire building's electricity expenses.

Too Dim? Inadequate light levels can hamper productivity and safety. Boosting light levels with the most efficient technologies can usually produce significant increases in light levels while yielding energy cost savings.

Too Bright? Overlighting wastes energy and contributes to visual discomfort. More lighting is not necessarily better lighting. Excessive lighting increases direct and reflected glare, and reduces contrast, which can contribute to eyestrain.

Poor Quality? Improving distribution, glare control, and color rendition can have a bigger impact on productivity than changes in light levels. Luminaire selection and placement need to be designed for the orientation of the workplane (vertical or horizontal), and provide for the correct uniformity and contrast levels. Improvements in color rendering can increase user perceptions of brightness and improve performance of color-critical tasks.

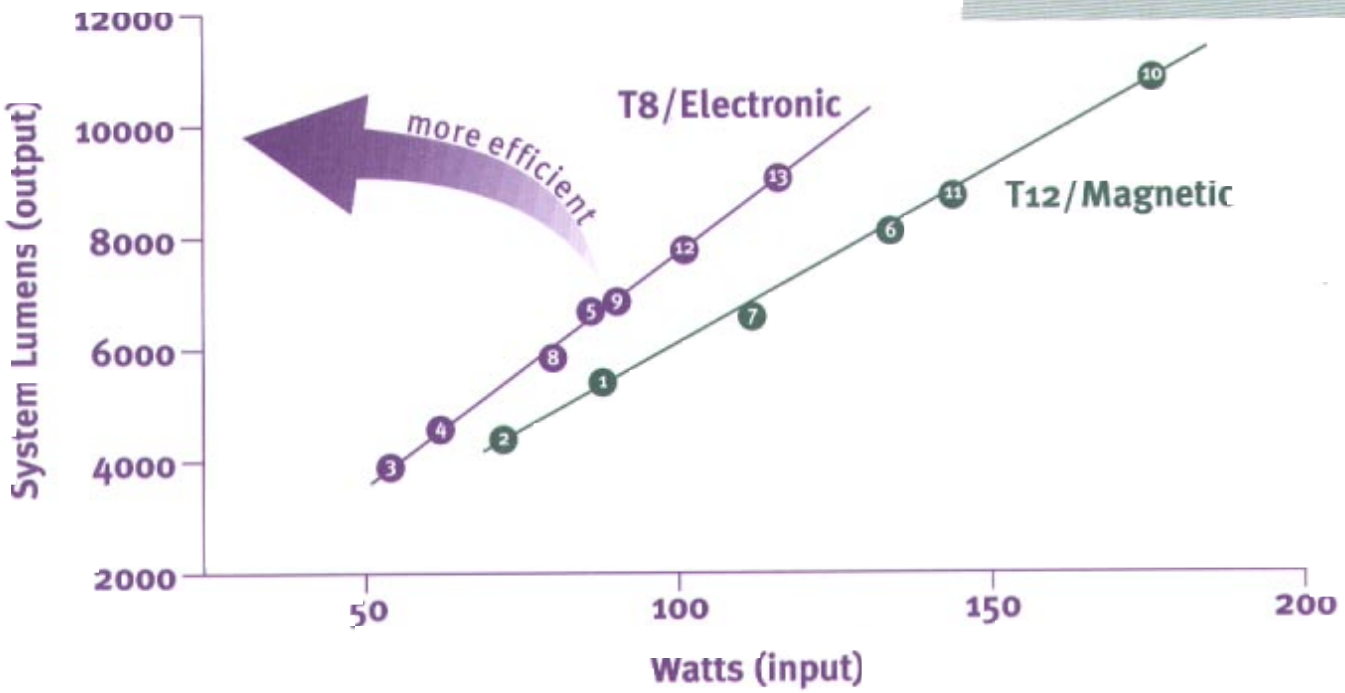
User Friendly? The most successful upgrades provide flexibility for meeting changing demands in the workplace. Consider the use of task lights and multilevel switching that can be tuned to meet changing visual requirements. Trial installations and employee education are critical for gaining acceptance of new light levels.

Other Considerations? Windows, room surfaces, and even production equipment can be considered as part of the lighting system and adjusted to improve visual performance. For example, painting the floors, walls, and ceiling in a more reflective color can boost light levels, while painting machinery or work stations in a contrasting color can improve task visibility.

For more guidance in selecting appropriate light levels for your visual tasks, refer to the Illuminating Engineering Society's *Recommended Practice 7; Industrial Lighting*.

FLUORESCENT SYSTEM PERFORMANCE

The Green Lights Program offers 2-day Lighting Upgrade Workshops, Application Profile brochures, and other technical support services to assist program participants in applying cost-saving lighting strategies. For more information, call the Green Lights Hotline at 1-888-STAR-YES.



Use the graph to determine some of your lighting upgrade options for modifying light levels.

1. Find the point on the graph that represents your current lighting system. (See key below.) Note the current lighting system lumens.
2. Determine the lighting system lumens that your upgrade should produce.
3. Find the lowest-wattage system that will produce this new lumen output (while maintaining/improving lighting quality).

The points on this graph assume 4-foot lamps with a color rendering index (CRI) of 75 and corrections for lamp lumen depreciation to indicate maintained lumen output.

The T8 electronic ballasts are rapid-start; up to 7% greater savings may be achieved with instant-start ballasts.

No modifications for improving luminaire efficiency are included. For a more in-depth analysis, use the *ProjectKalc* analysis software.

Key

Point Number	Number of Lamps	Lamp Type	Ballast Type
1	2	T12	EE Mag (BF=0.94)
2	2	T12/ES	EE Mag (BF=0.87)
3	2	T8	Low-Power EB (BF=0.75)
4	2	T8	Full-Output EB (BF=0.88)
5	2	T8	Extended-Output EB (BF=1.28)
6	3	T12	EE Mag (BF=0.94)
7	3	T12/ES	EE Mag (BF=0.87)
8	3	T8	Low-Power EB (BF=0.75)
9	3	T8	Full-Output EB (BF=0.88)
10	4	T12	EE Mag (BF=0.94)
11	4	T12/ES	EE Mag (BF=0.87)
12	4	T8	Low-Power EB (BF=0.75)
13	4	T8	Full-Output EB (BF=0.88)

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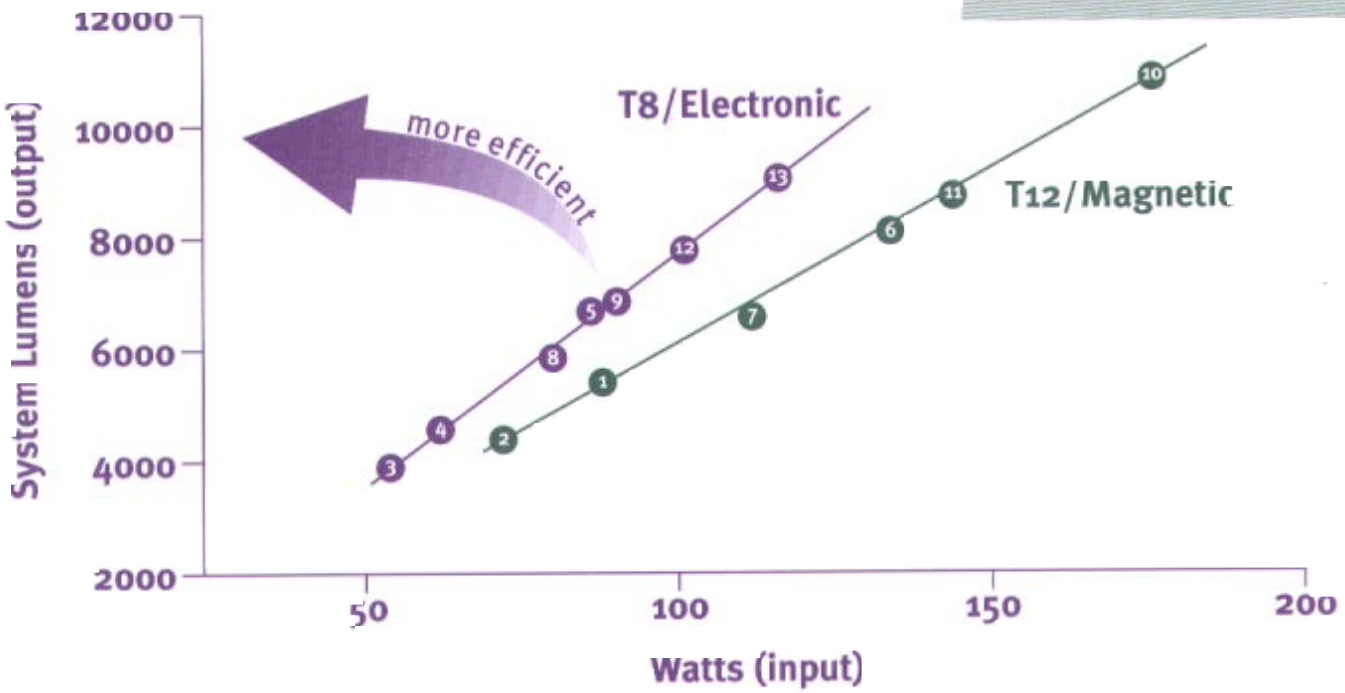

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